Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) A sensor system, comprising:

a nanosensor comprising at least one conductive channel comprising an array of substantially aligned carbon nanotubes or carbon nanofibers embedded in a polymer matrix film;

a first electrode electrically contacting the carbon nanotubes or carbon nanofibers on a first portion of the at least one conductive channel;

a second electrode electrically contacting carbon nanotubes or carbon nanofibers on a second portion of the at least one conductive channel; and

wherein the carbon nanotubes or carbon nanofibers generally extend in a direction parallel to a thickness direction of the polymer matrix film; and

the carbon nanotubes or carbon nanofibers are substantially aligned in a plurality of conductive channels extending in the polymer matrix film in a direction substantially perpendicular to the thickness direction of the polymer matrix film.

2. (Cancelled).

3. (Currently Amended) The sensor system of claim 1, wherein:

~~the nanosensor comprises a polymer matrix containing the carbon nanotubes or carbon nanofibers; and~~

the at least one conductive channel[[s]] comprises the carbon nanotubes or carbon nanofibers extending length wise through the polymer matrix such that opposing ends of the carbon nanotubes or carbon nanofibers are exposed in opposing faces of the polymer matrix.

4. (Currently Amended) The sensor system of claim 1, wherein the nanosensor is adapted to provide information relating to a physical condition of a first material in contact with

the nanosensor due to variations of **a** current flowing through the nanosensor between the first and second electrodes.

5. (Original) The sensor system of claim 4, wherein:

the current flowing through the nanosensor between the first and second electrodes varies due to at least one of bending, twisting, breaking, static accumulation, and thermal induced changes of the carbon nanotubes or carbon nanofibers; and

the information relating to a physical condition comprises at least one of thermal effects, stress, strain, static build up, crack content, fracture content, and breakage content of the first material.

6. (Previously Presented) The sensor system of claim 1, further comprising:

a power supply adapted to provide a current through the nanosensor between the first and second electrodes;

a detector adapted to detect variations in conductivity of the carbon nanotubes or carbon nanofibers by detecting the variations in the current through the nanosensor between the first and second electrodes; and

a data processing device which is adapted to determine at least one of thermal effects, stress, strain, static build up, crack content, fracture content, and breakage content of ~~the~~ a first material in contact with the nanosensor in real time based on the variations in conductivity detected by the detector.

7. (Original) The sensor system of claim 6, wherein:

the first material comprises at least one of aircraft wing and aircraft chassis material; and

data from the data processing device is provided to at least one of a flight crew and a ground crew of the aircraft.

8. (Original) The sensor system of claim 4, wherein the first material is located in at least one of a building, industrial machinery and a movable vehicle.

9. (Currently Amended) The sensor system of claim 1, wherein:

the array of substantially aligned carbon nanotubes or carbon nanofibers comprises an array of selectively grown carbon nanotubes arranged in predetermined locations in the polymer matrix film ~~matrix material~~; and

the carbon nanotubes have diameters less than 1 μm and lengths greater than 1 μm~~; and~~

~~the matrix material comprises a polymer film~~.

10. (Original) The sensor system of claim 1, wherein the first and second electrodes are selected from a group consisting of Schottky contacts, pn junction diode contacts, metallic ohmic contacts, conductive organic contacts and semiconductor contacts.

11. (Original) The sensor system of claim 10, wherein the first and second electrodes are selected from a group consisting of bulk chip structures, thin films and wires.

12. (Previously Presented) The sensor system of claim 4, wherein the nanosensor is flexible and adapted to be removable from the first material.

13. (Original) The sensor system of claim 4, wherein the nanosensor is further adapted to act as at least one of an anti-static coating, a thermal conductor, an antenna and a structural reinforcing material.

14. (Previously Presented) A movable vehicle, comprising:

a movable vehicle body;

at least one sensor system of claim 1 incorporated into or in contact with the vehicle body.

15. (Original) The movable vehicle of claim 14, further comprising a data processing device which is adapted to receive information from the at least one nanosensor and to determine a real time physical condition of the vehicle body.

16. (Original) The movable vehicle of claim 15, wherein:

the movable vehicle comprises an aircraft;

the aircraft comprises a plurality of the sensor systems;

the nanosensors of the respective sensor systems are incorporated into or are located in contact with at least one of a wing and a chassis of the aircraft; and

data from the data processing device is provided to at least one of a flight crew and a ground crew of the aircraft.

17. (Original) The movable vehicle of claim 15, wherein the movable vehicle is selected from at least one of a car, truck, bus, boat, train, space vehicle, satellite, rocket and missile.

18-24. (Cancelled).

25. (Currently Amended) <u>A method of determining a physical condition of a material comprising:</u>

<u>(i) providing at least one nanosensor incorporated into or in contact with the material, the at least one nanosensor comprising at least one conductive channel comprising an</u>

array of substantially aligned carbon nanotubes or carbon nanofibers embedded in a polymer matrix film;

(ii) receiving information from the at least one nanosensor;

(iii) determining the physical condition of the material based on the information from the at least one nanosensor; and

(iv) applying a voltage to the at least nanosensor between a first electrode electrically contacting the carbon nanotubes or carbon nanofibers on a first portion of the at least one conductive channel and a second electrode electrically contacting the carbon nanotubes or carbon nanofibers on a second portion of the at least one conductive channel such that a current flows through the at least one nanosensor;

~~The method of claim 24,~~ wherein:

~~the nanosensor comprises a polymer matrix film containing the carbon nanotubes or carbon nanofibers;~~

the carbon nanotubes or carbon nanofibers generally extend in a direction parallel to a thickness direction of the polymer matrix film; and

the carbon nanotubes or carbon nanofibers are substantially aligned in a plurality of conductive channels extending in the polymer matrix film in a direction substantially perpendicular to the thickness direction of the polymer matrix film.

26. (Currently Amended) A method of determining a physical condition of a material comprising:

(i) providing at least one nanosensor incorporated into or in contact with the material, the at least one nanosensor comprising at least one conductive channel comprising an array of substantially aligned carbon nanotubes or carbon nanofibers embedded in a polymer matrix film;

(ii) receiving information from the at least one nanosensor;

(iii) determining the physical condition of the material based on the information from the at least one nanosensor; and

(iv) applying a voltage to the at least nanosensor between a first electrode electrically contacting the carbon nanotubes or carbon nanofibers on a first portion of the at least one conductive channel and a second electrode electrically contacting the carbon nanotubes or carbon nanofibers on a second portion of the at least one conductive channel such that a current flows through the at least one nanosensor;

~~The method of claim 24,~~ wherein:

~~the nanosensor comprises a polymer matrix containing the carbon nanotubes or carbon nanofibers; and~~

the at least one conductive channel[[s]] comprises the carbon nanotubes or carbon nanofibers extending length wise through the polymer matrix such that opposing ends of the carbon nanotubes or carbon nanofibers are exposed in opposing faces of the polymer matrix.

27. (Currently Amended) The method of claim [[24]] 26, wherein:

the step of receiving information from the at least one nanosensor comprises receiving real time information by continuously detecting variations in the current flowing through the at least one nanosensor between the first and second electrodes; and

the step of determining the physical condition of the material comprises determining a real time physical condition of the material.

28. (Previously Presented) The method of claim 27, wherein:

the current flowing through the nanosensor between the first and second electrodes varies due to at least one of bending, twisting, breaking, static build up and thermal induced changes of the carbon nanotubes or carbon nanofibers; and

the step of determining a real time physical condition of the material comprises determining at least one of thermal effects, stress, strain, static build up, crack content, fracture content, and breakage content of the material from changes in conductivity of the nanosensor.

29. (Currently Amended) A method of determining a physical condition of a material comprising:

(i) providing at least one nanosensor incorporated into or in contact with the material, the at least one nanosensor comprising at least one conductive channel comprising an array of substantially aligned carbon nanotubes or carbon nanofibers embedded in a polymer matrix film;

(ii) receiving information from the at least one nanosensor;

(iii) determining the physical condition of the material based on the information from the at least one nanosensor; and

(iv) applying a voltage to the at least nanosensor between a first electrode electrically contacting the carbon nanotubes or carbon nanofibers on a first portion of the at least one conductive channel and a second electrode electrically contacting the carbon nanotubes or carbon nanofibers on a second portion of the at least one conductive channel such that a current flows through the at least one nanosensor;

wherein:

the step of receiving information from the at least one nanosensor comprises receiving real time information by continuously detecting variations in the current flowing through the at least one nanosensor between the first and second electrodes; and

the step of determining the physical condition of the material comprises determining a real time physical condition of the material; and

wherein:

the current flowing through the nanosensor between the first and second electrodes varies due to at least one of bending, twisting, breaking, static build up and thermal induced changes of the carbon nanotubes or carbon nanofibers; and

the step of determining a real time physical condition of the material comprises determining at least one of thermal effects, stress, strain, static build up, crack content, fracture content, and breakage content of the material from changes in conductivity of the nanosensor;

~~The method of claim 28, further comprising a step of~~

(v) analyzing the information received from the at least one nanosensor, comprising:

a) providing data representative of a change in at least one of thermal and electric conductivity of the at least one nanosensor;

b) determining whether the change is due to shifts of the nanosensors or actual fractures by comparing the change to previously stored data;

c) incrementing a point in a relevant stress, strain, thermal, DC and AC position as a reference data-point is compared against it; and

d) placing the data into a grid pattern for mathematical analysis and go/no go options.

30. (Original) The method of claim 29, further comprising determining whether the values of the physical conditions are within acceptable tolerance and at least one of signaling or displaying an alarm if at least one value of the physical condition is outside acceptable tolerance.

31. (Original) The method of claim 30, further comprising the step of displaying the determined values of the physical conditions.

32. (Original) The method of claim 29, further comprising the following steps in relative order:

a) normalizing a collected and stored thermal and electrical conductivity data;

b) comparing the normalized collected and stored thermal and electrical conductivity data;

c) rejecting the thermal and electrical conductivity data if the difference in the comparing step exceeds a predetermined amount.

33. (Currently Amended) The method of claim [[28]] 25, wherein the material comprises at least one of aircraft wing and aircraft chassis material.

34. (Original) The method of claim 33, further comprising analyzing a sample signal received from the at least one sensor and comparing it with a reference signal for databasing, in-flight recording and safety analysis.

35. (Original) The method of claim 33, further comprising providing the real time physical condition of the material to at least one of a flight crew and a ground crew of the aircraft.

36-53. (Cancelled).

54. (New) The method of claim 26, wherein the material comprises at least one of aircraft wing and aircraft chassis material.

55. (New) The method of claim 54, further comprising analyzing a sample signal received from the at least one sensor and comparing it with a reference signal for databasing, in-flight recording and safety analysis.

56. (New) The method of claim 54, further comprising providing the real time physical condition of the material to at least one of a flight crew and a ground crew of the aircraft.

57. (New) The method of claim 29, wherein the material comprises at least one of aircraft wing and aircraft chassis material.

58. (New) The method of claim 57, further comprising analyzing a sample signal received from the at least one sensor and comparing it with a reference signal for databasing, in-flight recording and safety analysis.

59. (New) The method of claim 57, further comprising providing the real time physical condition of the material to at least one of a flight crew and a ground crew of the aircraft.

60. (New) The method of claim 25, wherein the polymer matrix film contains carbon nanotubes.

61. (New) The method of claim 25, wherein the polymer matrix film contains carbon nanofibers.

62. (New) The method of claim 26, wherein the polymer matrix film contains carbon nanotubes.

63. (New) The method of claim 26, wherein the polymer matrix film contains carbon nanofibers.

64. (New) The method of claim 29, wherein the polymer matrix film contains carbon nanotubes.

65. (New) The method of claim 29, wherein the polymer matrix film contains carbon nanofibers.